

CLAIMS

1. A process of chemical-biological stabilization for the remediation of soil and cuttings contaminated with oils and derivatives of petroleum, in which the transformation of the organic contaminant into an inoffensive material is achieved. The treatment process for the contaminated material is carried out in an area, which we shall call cell, said cell is used to avoid run-off of hydrocarbons into the subsoil or to adjacent lands, these cells are of materials and designs typical of bioremediation by land farm. The cell has dimensions sufficient in area to be able to accommodate all of the materials to treat, as well as the conditioners that will be added to a height no greater than 50 cm approximately. It is important that the cell be leveled with a grade of approximately 1-2 % towards a leachate pond. In the majority of soils it is recommended to use a liner of at least 30 mil (approximately 0.76 mm) thick, of high density polyethylene (HDPE), thermally sealed. In very clayey and compacted soils it may not be necessary to use a liner, always when this is confirmed by a geotechnical study. Besides these considerations, it is important that the work area be surrounded by berms of a minimum of 1-2 meters high, the process is characterized because subsequent to the preparation the contaminated material is placed in the cell, such as soil and/or sediment and/or cuttings, to this is added a chemical reagent that contains calcium oxide in concentrations sufficient to produce alkaline conditions (pH of approximately 9 to 12). The concentration of the calcium oxide resulting from the mix of the chemical reagent plus the soil and/or sediment and/or cuttings with a chemical reagent that contains calcium oxide is in the interval of 1 to 10 % on a dry weight basis of the mixture. The materials are thoroughly mixed until their

homogenization is achieved, and they are moistened at a percentage of approximately 70 to 100 % of the field capacity of the material, this is mixed completely and the mixture is let to rest for a period of time that may vary from an interval of 2 hours to 180 natural days. Once this period has pasts, organic conditioners are added to the mixture at a concentration of approximately 1 to 15 % on a dry weight basis of the mixture. Once completely mixed, the material in treatment is placed on top of a layer of sand, gravel, sandy soil, or similar material to improve the free drainage of the material in treatment and to maintain aerobic conditions; the thickness of the layer of material in treatment place on top is approximately 5 to 150 centimeters, inorganic nutrients can be added to the mixture in treatment to stimulate microbial and vegetative biological treatment. Once the cell is prepared, the materials are not mixed, they are left to rest to cure by mineralization and humification processes during a period which is variable between 15 to 730 natural days. For this part of the treatment vegetation can be planted or it may be left to be seeded naturally by native weeds from the environment. During the maturation phase the cell is monitored periodically.

2. The process described in claim 1, characterized because it can be cyclic or repetitive.

3. The process described in claim 1, characterized because, the mixing of soil and/or sediment and/or cuttings with the chemical reagent that contains calcium oxide is repeated, as well as letting the mixture of chemical reagent plus soil and/or sediment and/or cuttings rest.

4. The process described in claim 1, characterized because, the step where organic conditioners are added to the mixture of chemical reagent plus soil and/or sediment and/or cuttings is repeated, to subsequently extend the homogenized material in a layer for curing.

5. The process described in claim 1, characterized because the calcium oxides used in the mixture are preferentially calcium monoxide (quick lime), calcium hydroxide (hydrated lime), or any combination of these, from formulations or natural mineral sources.

6. The process described in claim 1, characterized because the chemical reagent applied to the mixture contains substances which convert to calcium oxides when in contact with soil, sediment, cuttings, water moisture, or free water.

7. The process described in claim 1, characterized because the conditioners that are added to the mixture of chemical reagent with the other materials consists of sawdust, coconut husk, straw, alfalfa, rice husk, pineapple wastes, citrus wastes, pasture, marshy vegetation, organic peat, bamboo wastes, eucalyptus wastes, banana wastes, sugar cane cachasse, sugar cane bagasse, cacao husk, cow manure, horse manure, pig manure, goat manure, or mixtures thereof.